DOCUMENT RESUME

ED 285 640 PS 016 542

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TITLE Developmental Pacing as an Alternative to Ability Grouping in a Primary Setting.
PUB DATE 12 May 87
NOTE 12p.
PUB TYPE Guides - Classroom Use - Guides (For Teachers) (052)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Ability Grouping; Developmental Programs; *Developmental Stages; *Elementary School Students; *Grouping (Instructional Purposes); *Identification; Instructional Development; Primary Education; Testing
IDENTIFIERS *Cognitive Developmental Grouping

ABSTRACT

An alternative to ability grouping for instructional purposes exists. Cognitive developmental grouping (CDG), sometimes labeled "tracking" or "pacing," organizes students in terms of similar learning styles and takes into consideration the child's intellectual maturation rather than performance within a particular curriculum package. In order to successfully use CDG, teachers must understand and identify each child's developmental learning style in order to appropriately place the youngster for instruction. Children assigned to instruction by developmental level will, therefore, no longer be identified as members of high, middle, or low ability groups, but rather as preoperational, concrete operational, or formal operational learners. These developmental levels are characterized, respectively, by inability to consider another's position and the use of short-term memory; the ability to learn initially by concrete discovery and then apply earlier learning to new and sometimes novel situations; and by abstract learning. Abstract learning is rare among children and adults, including elementary school teachers. To assess children's level of development, teachers should first test for conservation and class inclusion. They should continuously reassess and readjust group membership, as children progress rapidly from one level to the next once appropriate schema have been developed. Guidelines are offered for designing developmentally appropriate instruction. (RH)

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Developmental Pacing as An Alternative To Ability Grouping in a Primary Setting

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EQUITY IN THE ELEMENTARY SCHOOL THROUGH THE USE OF DEVELOPMENTAL RATHER THAN ABILITY GROUPING IN A PRIMARY SETTING

Developmental placement implies children are grouped in a manner which takes into account developmental progress rather than ability. This development could be physical in that schools could organize for instruction by physical attributes. All children over 40 pounds will be in the Bluebirds, all children 30-40 pounds will be in the Robins and all children under 30 pounds will be in the Buzzards group. Another form of developmental grouping could be based on hair color; all blonds in the White group; all brunettes in the Blue group and all redheads in the Red group. Still another grouping scheme could be based upon age; all seven-year-olds in the 2nd grade, all six-year-olds in the first grade, and all five-year olds in kindergarten. All of these patterns or forms of grouping suggested above offer little in the way of enhancement of instructional effectiveness. The latter grouping scheme, by age, is the most common and by itself does little to enrich or depreciate established workable units for instruction. Schools treat children as members of a particular age group, arranging them so children of similar chronological age are assembled together. Within these similar age groups, a further fragmentation is accomplished with ability being the most common instructional grouping pattern in use.

Ability grouping is common among today's teachers, even though it is generally understood that this form of grouping may have negative effects on both instructional effectiveness and student attitude toward school and their own self worth. While many teachers understand the drawbacks associated with ability grouping, little is done to alter this form of curricular arrangement in the majority of elementary classrooms.

A great deal of variability may exist among and between children in a typical elementary classroom; innate abilities are just not the same. Some children are better readers, some children are better with mathematics and, with these children, competent teachers rightly feel as if they are unable to effectively present equivalent material to all simultaneously. Consequently, teachers are left with few alternatives to a system which many feel is instructionally and equitably ineffective based upon differences in skill, culture, language, and parental interaction influencing the children's abilities? Teachers have been charged with avoiding ability grouping but have not been presented with an alternative. As a result, ability grouping is prevalent even though many teachers may feel uncomfortable with that particular grouping paradigm.

Research demonstrates ability grouping to be hazardous, potentially leading to the tracking of dissimilar ability children (Barr, R. and R. Dreeben, 1977). This tracking forces groups with similar abilities or experiences together for long periods of time, in most cases the instructional periods. Many groups, particularly minority cultural groups, have claimed tracking to be a form of segregation, resulting in rampant prejudicial behavior, since many minority children populate the lower ability groups

when this form of instruction is used (Oakes, J., 1985).

Most new teachers and many teaching veterans use ability grouping for instruction purposes (Wilson and Schmits, 1978). One possible explanation for the use of this particular organizational pattern could lie in the fact that teachers have not be introduced to other alternative classroom organizational patterns. Does the possibility exist for excellence as well as equitability or does the push for excellence in today's schools preclude an equitable grouping pattern? Can teachers be as effective with instructional groups in a system which is not based upon ability, or is this form of grouping a fact of life, something which we have lived with for the past 125 years and appear to be destined to pursue indefinitely? Afterall, all children do not learn in the same manner nor do they have the same innate abilities. Consequently if we wish to incorporate the most effective form of instructional economy, ability grouping intuitively appears to be the most effective system even though research has demonstrated this to not necessarily be the case (Oakes, J. 1986).

However, there is an alternative to the ability pattern. Rather than using the ability grouping scheme, educators may wish to consider the developmental grouping pattern outlined below. The underlying purpose for the developmental grouping pattern is to generate heterogeneous groups related to ability. This pattern will take advantage of different ability patterns within one developmental learning style. It will provide teachers with an alternative to ability grouping while simultaneously framing manageable groups in terms of instructional efficiency. Children with similar learning styles will be clustered rather than children of similar abilities, which may help to avoid artificial classroom achievement spread, identified in the literature as a consequence of ability grouping (Hallinan and Sorensen, 1983).

Cognitive Developmental Grouping

The alternative to ability grouping, sometimes labeled as tracking or pacing, is Cognitive Developmental Grouping (C.D.G.). This form of grouping takes into account the child's intellectual maturation rather than performance within a particular curriculum package. This grouping system requires teachers to see children as developmental beings whom are capable of successfully dealing with curricular materials if instructional strategies, rather than curriculum, are altered to meet their divergent learning styles.

Jean Piaget and others have identified developmental stages of intellectual operation in which all individuals tend to function. However, even though there is supporting evidence to suggest that individuals who function at divergent or dissimilar developmental levels in many cases are not deficient in ability, little has been done to incorporate this organizational strategy in the classroom, nor have universities taken the lead in suggesting this approach as an alternative to ability grouping within the elementary classroom.

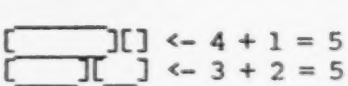
In order to be successful using the C.D.G. system teachers must understand and identify each individual child's developmental learning style in order to appropriately place the youngster for instruction. This requires an individual assessment of each child

which will help to determine the required instructional strategy necessary for each unique developmental grouping. While this may appear to be cumbersome and time consuming, in reality this approach requires little initial start up time and reveals a great deal of additional information, allowing the instructor a valuable sense of individual children within a particular classroom setting. Children assigned to this grouping scheme will no longer be identified as high, middle or low ability groups, but as preoperational, concrete, or formal operational learners allowing the stigma of variant abilities to be lessened.

In order to develop the C.D.G. system within the classroom, the following description of developmental levels is offered. These developmental clusters, rather than ability clusters, will be used, following individual assessments completed early in the school year. These individual assessments will allow for the formation of instructional groups when organizing students for learning. This will allow for new and differential instructional strategies for each developmental group rather than variant curricular materials for each previously identified ability cluster.

The Preoperator

Many young children are tied to concrete manipulatives when solving problems. These individuals have difficulty when generalizing from one set of circumstances to another with any real understanding. An individual who is operating under this stage of development could, quite handily solve the following equation 3 + 2 = 5 and could solve this equation 4 + 1 = 5, but apply them simultaneously and ask the child if 3 + 2 = 4 + 1 and the likely answer may be "no they are not the same because four is bigger". This response indicates the child is not acting abstractly on both equations simultaneously, however, offer a set of manipulatives to the child and suggest a similar dilemma and more than likely he will report both sets to be equal. This child is functioning as a preoperational learner. See the example below dealing with the use of manipulatives with the preoperational learner demonstrating the the equation. These materials, a set of cuisenaire rods, effectively demonstrate equality for the preoperator, who otherwise would not have been able to develop much in the way of understanding regarding this interrelationship of numbers and basic facts.



A common characteristics of the preoperator is the lack of ability to decenter. This inability to consider another's position, which may be different from their own, is tied to personal egocentricity, inability to deal with conservation, and the necessity for solving problems through the use of concrete manipulatives. The preoperator is unable to separate the concrete example from the abstraction which could explain why this child

has difficulty with paper and pencil tasks directly following successful experiences with concrete manipulatives. The early preoperator may have absolute success at 9:00 a.m. however behave as if he had never experienced the material by 10:00 a.m. This may be due to the child's developmental inability to functioning in long term memory at this age. This child deals predominantly in the short term memory phase and is capable of selective attention for relatively short periods. The teacher of the preoperational child must be able to change activities at least every twenty minutes in order to keep this child's attention, related to this memory trait, focused on the task at hand.

The Concrete Operator

The concrete operator is characterized by the ability to learn initially by concrete discovery and then display the ability to apply previously discovered material in a new and sometimes novel situation. This child has the capability for application of knowledge. The child will initially learn a concept concretely, using manipulatives, and then be able to apply this newly developed idea to an abstraction of that concept. Paper and pencil tasks built upon concrete experiences are examples of what the concrete operator is capable of mastering. The teacher's primary consideration for dealing with the concrete operator is to, first supply the learner with direct experiences, either through hands on materials or through a previous personal experience. Following direct experience the child should be capable of applying this new knowledge to develop a more mature form of information, providing there is a relevant connection between the material previously experienced and the new material to be learned. A child is capable of learning multiplication, for example, if the teacher uses concrete materials while relating the multiplication process to the addition process.

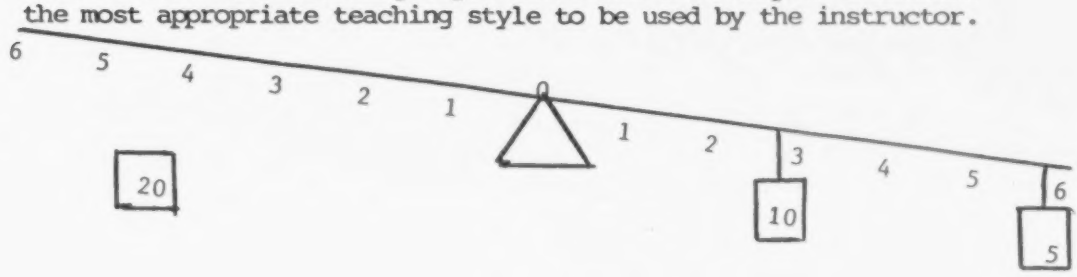
The Formal Operator

The formal operator is characterized by abstract learning. While few individuals process completely new material entirely in the abstract, the formal learner is capable of creating adjustments from antecedent concrete concepts to previously unknown or discovered abstract principles. This is the individual who is able to make sense of abstract sciences and apply these principles to everyday concrete circumstances. Many adults fail to achieve complete formal operational abilities. In fact, only about 12% of adults who act as elementary teachers function primarily at the formal operational level (Reyes, 1987). This is not to suggest that elementary teachers are somehow deficient of intellectual skill. It does suggest, however, that elementary teachers predominantly solve problems using a concrete operational style.

Find Your Developmental Level

The following is an example is an adult version of a cognitive operational assessment which could be used to determine how an individual is primarily functioning in terms of this one particular task. This item by no means is a suggestion of

invariant operation at a level but is an indication for how one may approach and solve novel situations and problems. The solution to this question is presented at the conclusion of this article, allowing the reader the opportunity to determine at what operational level he/she is primarily functioning. This activity reveals a method of operation for this one particular task and by no means is a suggestion of intellectual ability on the part of the adult who attempts to solve this problem. It is, however, an indication of the strategy or developmental operational approach to a particular problem. One operational approach, whether concrete or formal is not superior to another, however, each problem solving style is distinctly different. Just as with children, the important information revealed by this assessment is not whether one is correct, but how the individual arrived at the information. The learning style uncovered will help to determine the most appropriate teaching style to be used by the instructor.



(Good, R., 1977)

Use the drawing above to solve the following situation. This is an example of a balance scale. Because the weights on the left hand side of the scale have caused an imbalance place the 20 weight in the proper position in order to reestablish balance on the scale. In addition to placing the weight on the appropriate hook, explain why that particular location was selected for the weight. Check your answer at the end of this paper to determine the cognitive developmental approach which was used in solving this particular situation.

Testing Children for Developmental Grouping

The initial test which should be completed with children is a check for conservation. A test for conservation of number has been included here. However, conservation of volume, matter, or length could be substituted.

Ask the child to count five objects from a set of like objects. Then ask the child to count five more identical objects from the previous set. Arrange the objects as follows:

` ` ` ` ` row 1

` ` ` ` ` row 2

Ask the child the following series of questions;

a. how many objects in row 1?
b. how many objects in row 2?
c. are there more objects in row 1, more in row 2, or

are they both the same?

If the child is successful with this set of questions arrange the objects to appear similar to below and ask the following questions:

` ` ` ` ` row 1

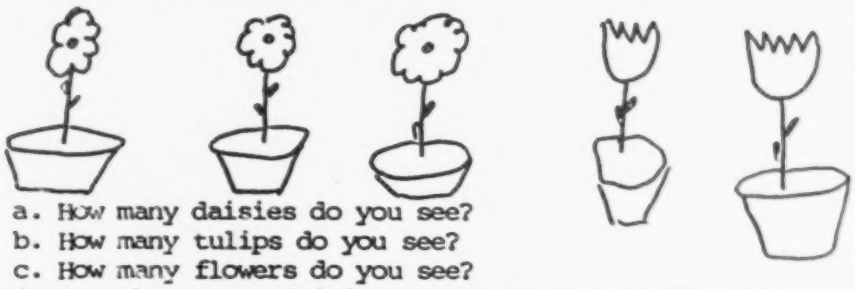
` ` ` ` ` row 2

a. are there more objects in row 1, more objects in row 2, or are they both the same?
b. why?

If the child is capable of explaining that nothing has been added or taken away, consequently the two sets must be the same, he has used the identity principle to successfully conserve the concept of number and should be further tested for an understanding of class inclusion.

Class Inclusion

Class Inclusion is the understanding that an object can be both a part in itself and a member of the whole group simultaneously. The child who does not effectively consider class inclusion will deal with the 3 + 2 = 4 + 1 dilemma by suggesting that the above statement is inaccurate because 4 is greater. While the youngster who is successful in understanding the class inclusion principle will declare,"it doesn't make any difference how you arrange the subsets the result is still the set of five." In order to test for class inclusion ask the following questions based upon the drawings below.



a. How many daisies do you see?
b. How many tulips do you see?
c. How many flowers do you see?
d. Are there more daisies or are there more flowers?
e. Why?

The child who responds "there are more flowers" has successfully determined there are both daisies and tulips in the set of flowers so, of course there are more flowers. This child understands that an object can be both a member of a subset and a member of the larger set simultaneously; a skill many second or third graders have not, as yet developed.

Determining Developmental Placement

When placing youngsters in developmental groups be certain to constantly reassess and readjust group membership, as children

progress rapidly from one level to the next once the appropriate schema have been developed. Developmental groupings, like other forms of grouping, should be constantly reevaluated and arranged to match the results of growth in cognitive development.

The child who has not developed conservation of number is operating at the preoperational level and requires manipulatives in order to generate an understanding of new material. This child will not benefit from abstractions of the previously learned concept, as preoperational children do not generalize from the concrete to the abstract. Paper and pencil exercises are important, however, children tend not to learn new concepts beyond the rote level when presented in this fashion. The child who has developed conservation of number but is yet to developed an understanding of class inclusion is also operating predominantly as a preoperator. This child, although more advanced than the preoperator without an ability to conserve, is yet a concrete learner. While this child is in transition to concrete operational thought, he still requires new material to be initially introduced using manipulatives. Consequently, the teacher should understand little new understanding is gained by reinforcing these new concepts through the use of paper and pencil activities.

A child who has developed Conservation of Number and Class Inclusion but needs to use manipulatives, to explain his answers or to demonstrate understanding, is a concrete operator. This child learns optimally in a setting where he is exposed to a concept, first concretely, then reinforced with an abstraction of that concept. If the child were learning 3 + 2, for example, manipulative materials would be necessary followed by a worksheet to reinforce the manipulative presentation. This child would gain some benefit from limited exposure to paper and pencil tasks following introduction with concrete materials. The teacher, however, would only know this instructional strategy following analysis of the child's action on objects in order to determine how this youngster is interpreting and processing information.

The formal operator is one who is capable of identifying the underlying principles without first dealing with manipulatives and is capable of abstract explanation of phenomena. This child is one who is rare in today's classroom, especially in the primary grades. As mentioned earlier many adults fail to deal primarily in the abstract at the formal operational level.

Instruction Using Developmental Placement

Following an assessment of development, the instructor is now free to begin teaching using a developmental strategy. Since we know preoperational children learn new concepts quite successfully, regardless of difficulty when using manipulatives, the teacher's responsibility is to present this group with new concepts using concrete materials. The new concepts to be developed should be in the concrete mode as children will not generalize to an abstraction of the chosen manipulative. Three apples may not have the same meaning as the numeral "Three" when seen on a worksheet. However the preoperator is quite capable is

learning sophisticated material providing the instruction matches the child's cognitive developmental level.

The concrete operator, on the other hand, who is capable of generalizing to the abstraction of a concept previously developed in the concrete mode, will benefit from seeing the worksheet as a reinforcement of instruction. This child will be able to internalize the previous material, providing a firm foundation has been developed using concrete materials. This child should not be exposed to more concepts than the preoperator but should be reinforced with paper and pencil tasks which the preoperator will not have experienced.

The formal operator, should one exist, is capable of learning new concepts using worksheets and other abstractions, exclusively. This child is likely to be the one who has been labeled "gifted and talented" as this child absorbs new information abstractly. The traditional workbook and worksheet method will be adequate for concept development although the child will benefit from alternative activities aside from paper and pencil which would allow for additional creative experimentation and play.

The paramount consideration of developmental grouping is teacher flexibility. The teacher must be able to alter teaching strategies when dealing with different developmental groups. As the teacher travels from group to group, dissimilar teacher techniques are required. Children are presented with similar materials regardless of the group; teaching styles change. The preoperator is instructed using manipulative materials, the concrete operator is instructed using manipulative materials and a follow-up worksheet for reinforcement and the formal operator is free to learn on his own using available curricular materials with teacher enrichment. This should eliminate, to some degree, the pacing problem which actually increases a child's chances of remaining in the initially assigned ability group once instruction begins. By using a developmental grouping system in the classroom children are, at least, presented with the same amount of material thus lessening the chance that the initial placement will be constant. As the child progresses from development level to developmental level he should be free to move to another group as similar amounts of material have been presented to each group. This opportunity to move between groups does not exist in ability grouping systems where children from different groups are presented with different amounts of material.

If educators are truly interested in excellence and equitability in the schools than we should examine an alternative to ability grouping. One possible alternative to ability grouping is cognitive developmental grouping.

Solution to Find Your Developmental Level

A Preoperator

If you were unable to decide where to place the 20 weight without having the scale to use, you are operating as a preoperator. You need concrete objects in order for new learning

to take place. You should be in the primary grades rather than teaching them.

A Concrete Operator

If you were able to select a hook to hang the 20 weight based upon the following, or similar, logic you tend to be behaving as a Concrete Operator. "I placed the object on the three hook because when I used a teeter-totter and the big kid sat in the middle I could balance by sitting on the end. The farther out he moved the less chance I had to balance the teeter-totter. The farther out he moved, the more he weighed."

It is important to remember that one form of operation is not superior to another; just different requiring different instructional strategies from the teacher. Ability and development are, in many cases, not related.

A Formal Operator

If you responded in the following manner, you solved the puzzle formally. Since the ten weight at the three hook exerts 30 units of downward force and the five and the six hook also exerts 30 units of downward force, in order to balance the 20 with the the ten and the five weight, it must also exert 30 + 30 units of downward force or 60 units of downward force. In order for the 20 to exert 60 units of downward force, it must be placed on the three. Piaget labeled this thinking a logical deductive mathematical reasoning, which is another phrase for formal operation. Remember one level is not superior to another, however, one each method requires special teaching behavior.

At this point only 9% of the adult population, which I have tested, have solved the puzzle using the formal mode. This is an indication that we have either not had much practice being formal or we have not developed the ability to see things abstractly.

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